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(54) Abstract Title

**Quality assessment in a mobile communications system**

(57) A method of assessing the quality of communications between a mobile unit and a base station of a mobile communications system determines the number of packets of data received at the mobile unit and compares this number with the number of transmitted packets of data. The difference provides an indication of transmission quality and can be used, for example, in determining how subsequent transmissions are to be made, in terms of frequency and/or direction, and for billing and the like. As an alternative to a count of the number of packets received, the number of re-transmissions could be used.

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**QUALITY ASSESSMENT IN A MOBILE COMMUNICATIONS SYSTEM**

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**Field of the Invention**

The present invention relates to a system for determining the quality of transmissions between a mobile unit and a fixed base station in a mobile communications system.

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**Background of the Invention**

At present, telecommunications and mobile network operators measure customer call utilisation within the network. This measure is used for billing and the like.

With the advent of packet systems for voice and data communications, the potential for loss of quality is increased. This is due, for example, to over-subscription leading to congestion. Congestion leads to the discarding of user data (voice) packets. In the case of data, for guaranteed reception it may be necessary to re-transmit the data. Thus, the worse the system is, the more re-transmissions are required and worse is the service.

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**Summary of the Invention**

The present invention seeks to provide a system for assessing the quality of transmissions between a mobile unit and a fixed base station in a communications system.

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According to an aspect of the present invention, there is provided a method of determining communication quality in a communications system, including the steps of obtaining a measure of the amount of data received as a result of a data transmission; obtaining a measure of the amount of data transmitted; and determining the difference between the transmitted and received amounts of data and therefrom an indication of transmission quality.

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An indication of call quality can be used to determine transmission mode (such as direction, frequency and the like) or for other purposes such as billing.

- 5 Preferably, the data is transmitted between a mobile unit and a fixed base station of a mobile communications system.

The measure of amount of data received and the amount of data sent may be counted as a number of packets of data. The amount of data correctly  
10 received may be the number of packets of an adequate quality.

Alternatively, the measure of amount of data received may be obtained as the number of required re-transmissions.

- 15 According to another aspect of the present invention, there is provided a system for determining communication quality in a communications system, including means for obtaining a measure of the amount of data received as a result of a data transmission; means for obtaining a measure of the amount of data transmitted; and processing means for determining  
20 the difference between the transmitted and received amounts of data and therefrom an indication of transmission quality.

When implemented in a mobile communications system, the means for obtaining a measure of the amount of received data may be located in a  
25 mobile unit and the means for obtaining a measure of the amount of transmitted data and the processing means may be located in a fixed base station, the mobile unit being operative to send its measure to the base station.

### 30 Detailed Description of a Preferred Embodiment

An embodiment of the present invention is described herein, by way of example only.

- 35 A conventional mobile communications system, such as a GSM system, includes a mobile unit which is adapted to be able to count the number of

received packets which are of a satisfactory quality. At the fixed base station, any packets which are transmitted to the mobile unit are also counted.

- 5 Typically, the number of received packets of adequate quality will be less than the number of transmitted packets.

10 The mobile unit is also adapted to send to the base station, during an uplink transmission, the counted number of received packets of adequate quality. From this number the base station can determine the quality of communications with the mobile unit.

15 Such an indication of call quality can be used in determining how to communicate with the mobile unit, for example with an adaptive antenna by choosing a different one of the plurality of signal paths to the mobile unit, or by choosing a different transmission frequency. An indication of call quality could also be used to bill the user on the basis of the correctly received packets rather than time using the network.

- 20 It will be apparent that the quality of uplink communications could also be determined on the same basis.

25 In an alternative embodiment, communication quality could be determined on the basis of the number of re-transmissions requested by the receiving unit.

The changes required both at the base station and in the mobile unit can best be implemented in software, as will be readily apparent to the skilled reader.

### Claims

1. A method of determining communication quality in a  
5 communications system, including the steps of obtaining a measure of the  
amount of data received as a result of a data transmission; obtaining a  
measure of the amount of data transmitted; and determining the  
difference between the transmitted and received amounts of data and  
therefrom an indication of transmission quality.  
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2. A method according to claim 1, wherein the data is transmitted  
between a mobile unit and a fixed base station of a mobile communications  
system.
- 15 3. A method according to claim 1 or 2, wherein the measure of amount  
of data received and the amount of data sent is counted as a number of  
packets of data.
4. A method according to claim 3, wherein the amount of data correctly  
20 received is the number of packets of an adequate quality.
5. A method according to claim 1 or 2, wherein the measure of amount  
of data received is obtained as the number of required re-transmissions.
- 25 6. A system for determining communication quality in a  
communications system, including means for obtaining a measure of the  
amount of data received as a result of a data transmission; means for  
obtaining a measure of the amount of data transmitted; and processing  
means for determining the difference between the transmitted and  
30 received amounts of data and therefrom an indication of transmission  
quality.
7. A system according to claim 6, implemented in a mobile  
communications system, wherein the means for obtaining a measure of  
35 the amount of received data is located in a mobile unit and the means for  
obtaining a measure of the amount of transmitted data and the processing

means are located in a fixed base station, the mobile unit being operative to send its measure to the base station.

8. A method of determining communication quality in a  
5 communication system substantially as hereinbefore described.

9. A system for determining communication quality in a  
communication system substantially as hereinbefore described.